Automotive Immunity Test System (EMS-ISO7637)

Brochure

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Leader in Lighting & Electrical Test Instruments

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SYSTEM CONFIGURATION

Product Name	LISUN Model	Specification
Multifunctional Immunity Test instrument Host	LIS-7600	Mainly responsible for parameter configuration and status control of various waveform modules, and can be connected to a computer to enable upper-level control.
P1/2a Simulator	LIS-7610	Pulse 1 & Pulse 2a
P2b/4 Simulator	LIS-7620	Pulse 2b & Pulse 4
P3 Simulator	LIS-7630	Pulse 3a & Pulse 3b
P5a/5b Simulator	LIS-7650	Pulse 5a & Pulse 5b
Artificial Network	LISN200	Transient conducted emission EMI test, in conjunction with the TES200N as an integrated unit.
Switch	TES200N	Transient conducted emission EMI test, integrated with the LISN200 as a single unit.
Capacitive Coupling Clamp (CCC)(Optional)	VFTC	ISO 7637-3 testing, automotive electronic interference test.
Inductive Coupling Clamp (ICC)(Optional)	F-120-6A	ISO 7637-3 testing, specifically for slow pulse ISO 7637-3 testing.
Inductive Coupling Clamp Calibrating Set (ICC)(Optional)	FCC-BCICF-1	ISO7637-3 ICC Test, work with F-120-6A
Inductive Coupling Clamp Adaptor (ICC)(Optional)	ICC-AC	ISO7637-3 ICC Test, work with F-120-6A
Direct Capacitive Coupling (DCC)(Optional)	DCC-100	ISO7637-3 Common mode test: 100nF, 470pF, 100pF; Differential mode test: 470pF, 100pF.
19 Inch Cabinet (Optional)	CASE-19	Install the above instruments in a cabinet for a neat and professional appearance, with easy and convenient operation.

Note: The corresponding LISUN instruments can be optionally configured for testing the electrical performance of automotive electronics to fully meet the requirements of ISO 16750-2:2023, as well as manufacturer standards such as VW 80000 and GM 3172. For specific system configurations, please refer to the ISO 16750-2:2023 Automotive Electrics & Electronics Testing System.

Principle Introduction

As the number and variety of automotive electronic devices continue to increase, the electromagnetic environment within vehicles has become increasingly complex. At the same time, electronic devices and components on vehicles are highly sensitive to electromagnetic interference, leading to instances of mutual interference among electronic components. During vehicle operation, if electromagnetic interference occurs, it can result in reduced performance of the affected devices in mild cases, or complete loss of functionality in severe cases, posing significant safety risks to drivers.

To assess the transient voltage disturbances and electromagnetic compatibility of automotive electronic devices, the International Organization for Standardization (ISO) has established the standard ISO 7637-2:2011 (Road vehicles — Electrical disturbances from conduction and coupling — Part 2: Electrical transient conduction along supply lines only). The ISO 16750-2 (Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads) standard has been split, resulting in more standardized test requirements.

With the continuous development and refinement of automotive manufacturing technology, and to better meet people's higher demands for the quality of automotive life, automakers are increasingly adopting electronic and electrical systems in the research and development and manufacturing processes. As a result, the reliability of automotive electronic systems has become crucial for enhancing vehicle safety performance and efficiency. Therefore, the electromagnetic compatibility (EMC) characteristics of automotive electronics have become as important as the mechanical properties of vehicles. Consequently, EMC testing technology has become a significant component of the testing technology employed by international automotive manufacturers.

Technical Introduction:

• The system covers all the waveforms in the ISO-7637-2:2011 standard, it can provide all seven kinds of waveforms.

• Operation Interface: Utilizes a full-color capacitive touchscreen and an Android-based intelligent control system. Employing a main module expansion technology architecture, it offers high intelligence, ease of operation, and is easily upgradeable for future updates.

• Configuring various host interfaces enables waveform programming and facilitates human-machine information exchange and control.

• Capable of conducting electromagnetic compatibility (EMC) tests on 12V/24V automotive electronic systems.

• The arbitrary waveform generator features a high-power linear amplifier with a frequency response up to 150 kHz. Its rise or fall time is <3.5 μs, meeting the requirements of various automotive manufacturers.

• Customizable waveform editing: includes 16 types such as DC, sine wave, triangle wave, square wave, exponential wave, etc.

• The arbitrary waveform generator utilizes bipolar programmable power supplies, meeting the testing requirements for both positive and negative voltage, as well as zero-crossing (transition from positive to negative or negative to positive) testing demands.

• Professional EMS-ISO7637 testing software, with open management, customizable waveform creation, editable waveform storage, automatic generation of test reports in editable formats, and easy retrieval for subsequent tests.

• Built-in many domestics and foreign auto manufacturers standards. User can set standards directly at software to match test

1. Master control unit Immunity test system (LIS-7600)

The LIS-7600 utilizes LISUN's unique architecture, capable of power and information control management, as well as logical control of up to ten functional modules. It is equipped with a full set of computer communication interfaces and is controlled and managed by LISUN's independently developed EMS-ISO7637 testing software for automotive EMC testing systems. The main unit features a large LCD color screen control technology, enabling independent operation of any module and complex waveform editing and program testing even without software connectivity. Additionally, the LIS-7600 allows real-time monitoring of the actual operational status of each functional module and timely storage of data information.

2. Pulse 1/2a generator (LIS-7610)

Pulse 1: Simulating the transient disturbance caused by inductive load switching off when vehicle is in parallel with the tested product.

Pulse 2a: Simulating the transient disturbances in the on-line beam induced by the device are suddenly cut off when the device is in parallel with the measured object.

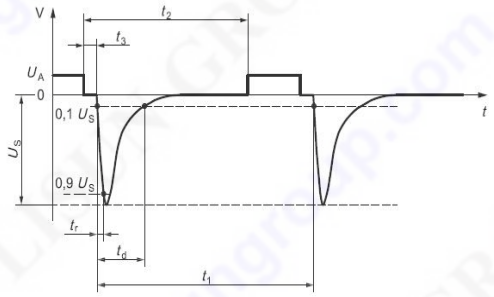


Figure 1: Pulse 1

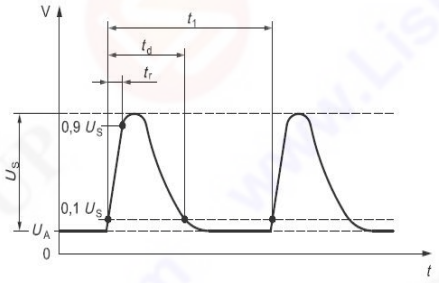


Figure 2: Pulse 2a

Specification:

Item	Specifications (Pulse 1)	Specifications (Pulse 2a)
Output voltage (Us):	-1~ -700V	1~150V
Output resistance (Ri):	2Ω,4Ω,10Ω,30Ω,50Ω	2Ω,4Ω,10Ω,30Ω,50Ω
Pulse width (Td):	50us,200us,300us,500us, 1ms,2ms	50us,200us,300us,500us, 1ms,2ms
Rise time (Tr):	1us: 0.5~1μs, 3us: 1.5~3μs	1us: 0.5~1μs
Repetition period (T1):	0.2~99.99	

3. Pulse 2b/4 generator (LIS-7620)

Pulse 2b: Simulating the transient interference caused by the generator effect of the DC motor is cut off.

Pulse 4: Simulating the power supply voltage variation caused by starting the internal combustion engine starter-motor circuit

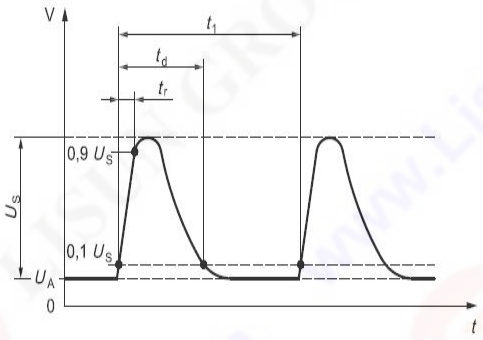


Figure 1: Pulse 2b

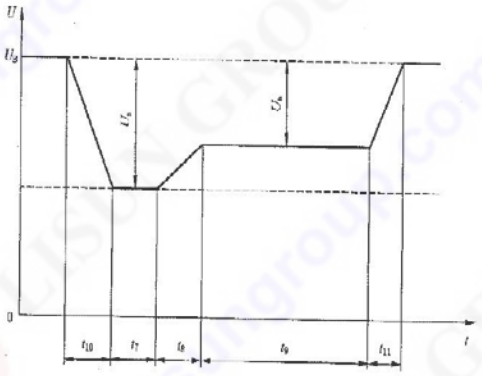


Figure 2: Pulse 4

Specification:

Item	Parameters	Specifications
Pulse 2b	Ua, Us	13.5V, 27V
	Output resistance (Ri)	0Ω~0.05Ω
	Pulse width (Td)	30~5000ms
	T12,Tr,T6	0.5~10ms
Pulse 4	UB	13.5V, 27V
	Us, Ua	0~ -UB
	Output resistance (Ri)	0Ω~0.02Ω
	Drop 1 duration time (T7):	1~1000ms
	Fall 1 rise time (T8):	2~100ms
	Drop 2 duration time (T9):	0.1~30s
	Fall time (T10):	5~10ms
	Fall 2 rise time (T11):	1~1000ms

4. Pulse 3a/3b generator (LIS-7630)

Pulse 3a: Simulating the transient interference caused by switching of analog inductive load. (Positive)

Pulse 3b: Simulating the transient interference caused by switching of analog inductive load. (Negative)

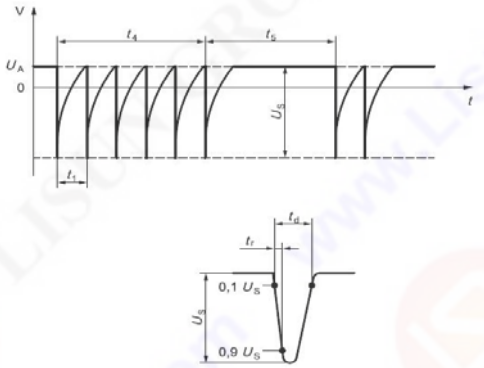


Figure 1: Pulse 3a

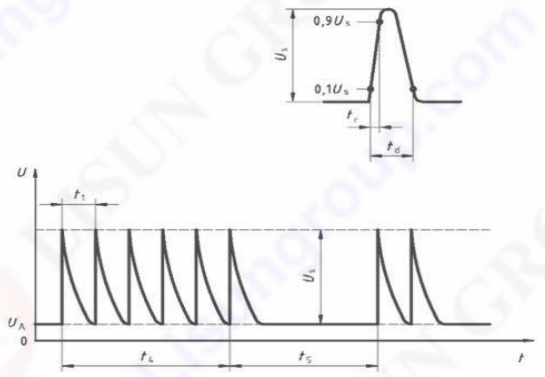


Figure 2: Pulse 3b

Specification:

Item	Specifications
Output voltage (Us)	0V~ ±800V
Output resistance (Ri)	50Ω
Pulse width（Td）	150ns±45ns
Pulse group width（T4）	10~100ms
Pulse group interval (T5)	0.01~60s
Rise time (Tr)	5ns±1.5ns
Repetition period (T1)	10~2000us

5. Pulse 5a/5b generator (LIS-7650)

P5a: Simulating the transient interference when the alternator is generating charging current while the battery is disconnected, and there are still other loads on the generator circuit

P5b: Simulating the transient interference that occurs due to the suppression circuit in the generator circuit under the above conditions

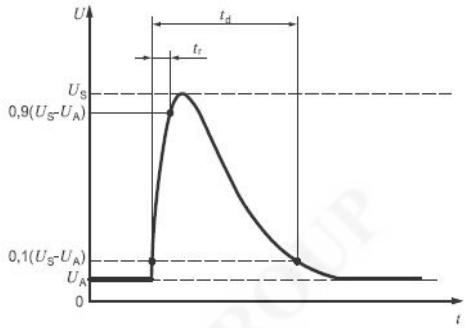


Figure 1: Pulse 5a

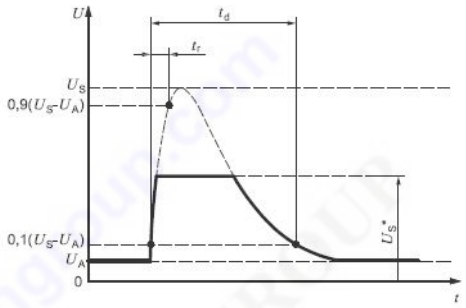


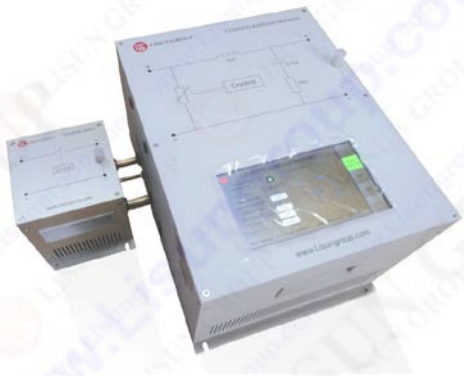
Figure 2: Pulse 5b

Specification:

- Pulse peak voltage (Us): 20V~200V(±10%);
- Input impedance (Ri): 0.5Ω to 8Ω;
- Pulse width (td): 40ms, 100ms, 200ms, 300ms, 350ms, 400ms (±20%);
- Rise time (tr): 5ms~10ms;
- Pulse action time: 60s~9999s(±10%);

Item	Parameters	Specifications
Pulse 5a	Pulse peak voltage (Us):	12V system: 20V~100V(±10%) 24V system: 20V~200V(±10%)
	Input resistance (Ri):	12V system: 0.5Ω~4Ω 24V system: 1Ω~8Ω
	Pulse width (Td):	40ms, 100 ms, 200ms, 300ms, 350ms, 400ms (±20%)
	Rise time (Tr):	5 ms~10 ms
	Pulse action time:	60s~9999s
Pulse 5b	Pulse peak voltage (Us):	12V system: 20V~100V(±10%) 24V system: 20V~200V(±10%)
	Output resistance (Ri):	12V system: 0.5Ω~4Ω 24V system: 1Ω~8Ω
	Pulse action time:	60s~9999s

6. Transient Conduction Emission (EMI) Test (LISN200、TES200N)



Emission test measures the interference caused by the work of the test device (DUT). The vehicle mounted electronic transient conduction and emission measurement mainly refers to the interference caused by the test device in the start and stop of the test device.

TES200N automobile electronic conduction transient emission test system completely meets the ISO7637-2 standard on the transient emission measurement requirements. It contains complete control unit, artificial power network, mechanical switch simulation system, the electronic switch simulation system. It uses unique touch screen control method designed by LISUN and good test characteristics and professional & convenient test system for automobile electronics. TES200N is the certified products by transient emission measurement for automotive electronics.

Battery Current	100A	Switching Time	300ns±20%
Battery Voltage	0-60VDC	Voltage Drop	<1V@25A
By pass Resistance	10,20,40,120Ω, EXT	Transient Voltage Protection	>440V
Trigger mode	External, Internal, Manual		
Battery off time	10ms~10s		
Battery power supply time	10ms~10s		
Relay Available Voltage	12V,24V,36V		
Mechanical Switch		Artificial Power Network	
Switching capacity	100A & 25A	Inductance / Capacitance / Resistance	5uH/0.1uF/50Ω

7. Capacitive Coupling Clamp for Vehicle Electronic Interference Test (VFTC)

The VFTC capacitive coupling clamp is special design for signal line immunity test requirement(which also can be used for power line test) of the P3 pulse test (which is a fast transient pulse) in the ISO7637-3 and GB / T32960.2-2016 standards. The performance of the design equipment comply the ISO7637-3 standard requirement.

Specification:

Model Number	VFTC
Coupling Capacitance	100～200pF
Injection Terminal	BNC
Dimension	1250*300*82mm(W*D*H)
Weight	15kg

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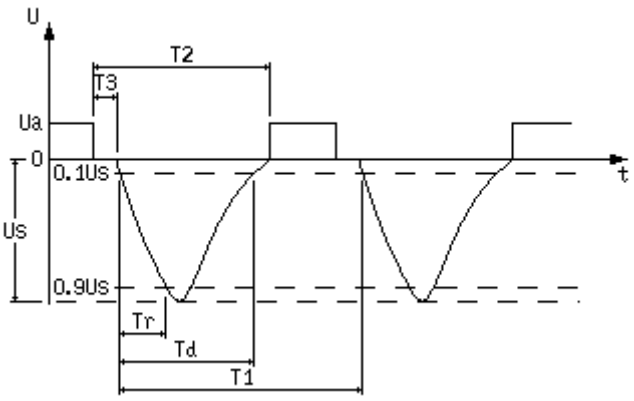
Test Report

Date: 29 Apr 2024

Infomation			
Test Company	LISUN	Test Engineer	Jacky
Report No.		Test Date	2024/4/29 11:34
Customer		Temperature	20℃
DUT		Humidity	50%
supplypower	13.5V	Atmospheric	101kPa
Standard	ISO/ISO 7637-2 2011/5.6.1 Test pulse 1	Mode	Pulse 1
Instrument	LIS-7610	Test Result	

Parameter

Us	- 112 V
T1	0.5 s
t2	200.00 ms
td	2
Ri(Ohm)	10
Count	500



Result	
11:35:12	START
11:39:26	FINISH